

REMARKS

The foregoing Amendment is being filed in response to the Office Action dated June 19, 2009. Reconsideration is respectfully requested.

The status of the claims is as follows.

Claims 1-18 are currently pending.

Claims 1-18 stand rejected.

Claims 1, 7-9, 11-14, and 16-17 have been amended.

Claims 4-6, 10, 15, and 18 have been canceled without prejudice.

The Examiner has rejected claims 1-18 under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements or steps, such omission amounting to a gap between the elements/steps. Specifically, the official action indicates that the elements/steps that produce the DC offset that is a function of a modulated photon density in the interaction region of the turbid medium are critical and essential. The Applicants have amended base claims 1 and 11 to address the Examiner's rejections under 35 U.S.C. 112, second paragraph. Accordingly, it is respectfully submitted that claims 1 and 11, as amended, satisfy the requirements of 35 U.S.C. 112, second paragraph, and therefore amended claims 1 and 11, and the claims depending directly or ultimately therefrom, should be deemed allowable.

The Examiner has rejected claims 1-7 under 35 U.S.C. 102(b) as being anticipated by Monchalin *et al.* (USP 5,131,748). The Applicants respectfully submit, however, that base claim 1, as amended, and the claims depending directly or ultimately therefrom, recite non-obvious subject matter that distinguishes

over the art of record, and therefore the rejections of claims 1-7 under 35 U.S.C. 102 should be withdrawn.

For example, amended base claim 1 recites the following:

"A system for detecting acousto-photonic emissions in optically turbid media, comprising:

a sound source for generating an ultrasonic wave for propagation through an optically turbid medium;

a light source for generating a signal light beam for transmission through the optically turbid medium, and for generating a reference light beam,

wherein the signal light beam is phase modulated in the presence of the ultrasonic wave within an interaction region of the optically turbid medium;

a photo-detector including a photo-refractive crystal for receiving the phase modulated signal light beam and the reference light beam, and for converting the phase modulated signal light beam to an intensity modulated signal light beam by interference of the phase modulated signal light beam and the reference light beam within the photo-refractive crystal, the intensity modulated signal light beam having a DC component; and

a signal analyzer for analyzing the DC component of the intensity modulated signal light beam to obtain a measure of a magnitude of a mean phase shift induced by the ultrasonic wave on the signal light beam within the interaction region of the optically turbid medium, and for analyzing at least one change in the magnitude of the mean phase shift, the at least one change in the magnitude of the mean phase shift being indicative of an object or an abnormality at the interaction region of the optically turbid medium." (emphasis added)

The official action indicates that the Monchalin reference discloses broadband optical detection of transient motion performed using a sound source, a light source, and a photo-detector. The official action further indicates, however, that the Monchalin reference does not expressly show the result that the intensity modulated signal beam has a DC offset that is a function of a modulated photon density in the interaction region

of the turbid medium, and that the DC offset is indicative of an object or an abnormality at the interaction region of the turbid medium. Nonetheless, the official action concludes that the Monchalin reference shows the same elements as claimed, and therefore the same outcome would result from the claimed elements.

The Applicants have amended base claim 1 to include a further structural limitation of the system, specifically, "a signal analyzer for analyzing the DC component of the intensity modulated signal light beam to obtain a measure of a magnitude of a mean phase shift induced by the ultrasonic wave on the signal light beam within the interaction region of the optically turbid medium, and for analyzing at least one change in the magnitude of the mean phase shift, the at least one change in the magnitude of the mean phase shift being indicative of an object or an abnormality at the interaction region of the optically turbid medium".

Because, as indicated in the official action, the Monchalin reference does not show an intensity modulated signal beam having a DC offset which is a function of a modulated photon density in an interaction region of a turbid medium, in which the DC offset is indicative of an object or an abnormality at the interaction region of the turbid medium, the Applicants respectfully submit that the Monchalin reference would not appear to teach or suggest a system including "a signal analyzer for analyzing the DC component of the intensity modulated signal light beam to obtain a measure of a magnitude of a mean phase shift induced by the ultrasonic wave on the signal light beam ..., and for analyzing at least one change in the magnitude of the mean phase shift" to obtain an indication of "an object or an abnormality at the

interaction region of the optically turbid medium", as recited in amended base claim 1.

For at least the reason discussed above, the Applicants respectfully submit that the Monchalin reference does not anticipate amended base claim 1, and the claims depending directly or ultimately therefrom. The Applicants respectfully point out that dependent claims 4-6 have been canceled without prejudice in the foregoing Amendment. Accordingly, it is respectfully submitted that the rejections of claims 1-7 under 35 U.S.C. 102 should be withdrawn.

The Examiner has rejected claims 1-2, 4-8, 10-12, 14-16, and 18 under 35 U.S.C. 102(b) as being anticipated by Dolfi *et al.* (USP 5,174,298). The Applicants respectfully submit, however, that base claims 1 and 11, as amended, and the claims depending directly or ultimately therefrom, recite non-obvious subject matter that distinguishes over the art of record, and therefore the rejections of claims 1-2, 4-8, 10-12, 14-16, and 18 under 35 U.S.C. 102 should be withdrawn.

As discussed above, base claim 1 has been amended to include the following structural limitation:

"a signal analyzer for analyzing the DC component of the intensity modulated signal light beam to obtain a measure of a magnitude of a mean phase shift induced by the ultrasonic wave on the signal light beam within the interaction region of the optically turbid medium, and for analyzing at least one change in the magnitude of the mean phase shift, the at least one change in the magnitude of the mean phase shift being indicative of an object or an abnormality at the interaction region of the optically turbid medium".

The official action indicates that the Dolfi reference discloses an imaging process and apparatus, comprising a sound

source, a light source, and a photo-detector, but does not expressly show the result that the intensity modulated signal beam has a DC offset that is a function of a modulated photon density in the interaction region of the turbid medium, and that the DC offset is indicative of an object or an abnormality at the interaction region of the turbid medium. The official action goes on to indicate, however, that the Dolfi reference shows the same elements as claimed, and therefore the same outcome would result from the claimed elements.

The Applicants respectfully submit, however, that because the Dolfi reference does not show an intensity modulated signal beam having a DC offset which is a function of a modulated photon density in an interaction region of a turbid medium, in which the DC offset is indicative of an object or an abnormality at the interaction region of the turbid medium, as indicated in the official action, the Dolfi reference would not appear to teach or suggest a system including "a signal analyzer for analyzing the DC component of the intensity modulated signal light beam to obtain a measure of a magnitude of a mean phase shift induced by the ultrasonic wave on the signal light beam ..., and for analyzing at least one change in the magnitude of the mean phase shift" to obtain an indication of "an object or an abnormality at the interaction region of the optically turbid medium", as recited in amended base claim 1.

Moreover, the Dolfi reference would not appear to teach or suggest a method including the steps of "analyzing, by a signal analyzer, the DC component of the intensity modulated signal light beam to obtain a measure of a magnitude of a mean phase shift induced by the ultrasonic wave on the signal light beam within the

interaction region of the optically turbid medium" and "analyzing, by the signal analyzer, at least one change in the magnitude of the mean phase shift induced by the ultrasonic wave on the signal light beam, the at least one change in the magnitude of the mean phase shift being indicative of an object or an abnormality at the interaction region of the optically turbid medium", as recited in amended base claim 11.

For at least the reasons discussed above, the Applicants respectfully submit that the Dolfi reference does not anticipate amended base claims 1 and 11, and the claims depending directly or ultimately therefrom. The Applicants respectfully point out that dependent claims 10, 15, and 18 have been canceled without prejudice in the foregoing Amendment. Accordingly, it is respectfully submitted that the rejections of claims 1-2, 4-8, 10-12, 14-16, and 18 under 35 U.S.C. 102 should be withdrawn.

The Examiner has rejected dependent claims 3 and 13 under 35 U.S.C. 103(a) as being unpatentable over the Dolfi reference in view of the Monchalin reference. The Applicants respectfully submit, however, that because the Dolfi and Monchalin references, taken alone or in proper combination, do not teach or suggest the structural limitation of

"a signal analyzer for analyzing the DC component of the intensity modulated signal light beam to obtain a measure of a magnitude of a mean phase shift induced by the ultrasonic wave on the signal light beam within the interaction region of the optically turbid medium, and for analyzing at least one change in the magnitude of the mean phase shift, the at least one change in the magnitude of the mean phase shift being indicative of an object or an abnormality at the interaction region of the optically turbid medium",

as recited in amended base claim 1, and/or the steps of

"analyzing, by a signal analyzer, the DC component of the intensity modulated signal light beam to obtain a measure of a magnitude of a mean phase shift induced by the ultrasonic wave on the signal light beam within the interaction region of the optically turbid medium; and

analyzing, by the signal analyzer, at least one change in the magnitude of the mean phase shift induced by the ultrasonic wave on the signal light beam, the at least one change in the magnitude of the mean phase shift being indicative of an object or an abnormality at the interaction region of the optically turbid medium",

as recited in amended base claim 11, the combined teachings of the Dolfi and Monchalin references would not suggest to one of ordinary skill in this art at the time of the invention the subject matter of amended claim 1 and claim 3 depending ultimately therefrom, and the subject matter of amended claim 11 and amended claim 13 depending ultimately therefrom. Accordingly, it is respectfully submitted that the rejections of dependent claims 3 and 13 under 35 U.S.C. 103 should be withdrawn.

The Examiner has rejected dependent claims 9 and 17 under 35 U.S.C. 103(a) as being unpatentable over the Monchalin reference in view of Brodeur *et al.* (USP 6,115,127), and the Dolfi reference in view of the Brodeur reference. The Applicants respectfully submit, however, that the Brodeur reference does not appear to remedy the deficiencies of the Monchalin and Dolfi references, and therefore the combined teachings of the Monchalin and Brodeur references, and the combined teachings of the Dolfi and Brodeur references, would not suggest to one skilled in this art at the time of the invention the subject matter of amended claim 9 which depends ultimately from amended base claim 1, and the subject matter of amended claim 17 which depends ultimately from amended base claim 11. Accordingly, it is respectfully submitted that the

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rejections of dependent claims 9 and 17 under 35 U.S.C. 103 should be withdrawn.

In view of the foregoing, it is respectfully submitted that the present application is in a condition for allowance. Early and favorable action is respectfully requested.

The Examiner is encouraged to telephone the undersigned Attorney to discuss any matter that would expedite allowance of the present application.

Respectfully submitted,

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